

**• • R E M A R K S / A R G U M E N T S • •**

The Official Action of May 21, 2004 has been thoroughly studied. Accordingly, the changes presented herein for the application, considered together with the following remarks, are believed to be sufficient to place the application into condition for allowance.

As requested by the Examiner on page 2 of the Official Action, applicant is submitting herewith a Substitute Specification under 37 CFR §1.125 (a) together with a hand-marked-up copy of the original specification showing the changes made to the original specification.

The undersigned affirms that the Substitute Specification only contains the changes noted in the hand-marked-up copy of the original specification and does not contain any new matter.

Entry of the Substitute Specification is respectfully requested.

Also by the present Amendment the Abstract has been changed.

In addition, the claims have been changed in the manner courteously suggested by the Examiner.

Entry of the Substitute Specification, amendments to the Abstract and amendments to the claims are respectfully requested.

Claims 1-3 are pending in this application.

Claims 1 and 2 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over co-pending application serial no. 10/627,267.

Claim 3 stands provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over co-pending application serial no. 10/627,267 in view of JP 2-180941.

In response to the provisional obviousness-type double patenting rejections, the undersigned notes that applicant will be filing a Terminal Disclaimer to overcome this rejection in due course and the Examiner is requested to hold this provisional rejection in abeyance until an executed Terminal Disclaimer can be obtained and submitted. (This case was recently transferred to the undersigned, who does not have a power of attorney to sign a Terminal Disclaimer for the applicant)

It is believed that the above represents a complete response to the Official Action and reconsideration is requested.

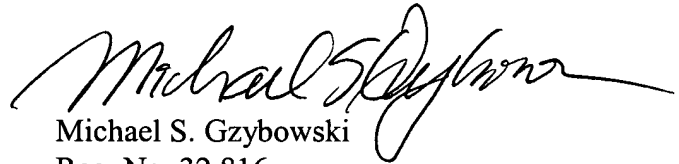
The prior art cited but not relied upon by the Examiner has been noted. This prior art is not believed to be particularly pertinent to applicants' claimed invention.

If upon consideration of the above, the Examiner should feel that there remain outstanding issues in the present application that could be resolved; the Examiner is invited to contact applicants' patent counsel at the telephone number given below to discuss such issues.

Appl. No. 10/627,267  
Amdt. Dated September 21, 2004  
Reply to Office Action of May 21, 2004

To the extent necessary, a petition for an extension of time under 37 CFR §1.136 is hereby made. Please charge the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 12-2136 and please credit any excess fees to such deposit account.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Michael S. Gzybowski", with a long horizontal flourish extending to the right.

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Reg. No. 32,816

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11775.1



## SPECIFICATION

### RESIN COMPOSITION FOR PURGING CONTAMINANT IN THE PLASTIC PROCESSING MACHINE

#### BACKGROUND OF THE INVENTION

##### 1. Field of the Invention

The present invention relates to a resin composition for purging ~~contaminant~~<sup>contaminants</sup> in ~~the~~<sup>a</sup> plastic processing machine.

##### 2. Description of the Related Art

Plastics have excellent properties such as easy processability, high ~~pro-~~<sup>productivity</sup> ductivity, light weight and relative low procuring ~~cost~~<sup>costs</sup>, so they are used for the parts and structural materials for ~~auto-~~<sup>automobiles</sup> mobile, automobile<sup>s</sup>, scooter<sup>s</sup>, television<sup>s</sup>, radio<sup>s</sup>, audio equipment<sup>s</sup>, washing machine<sup>s</sup>, rice<sup>s</sup> cooker<sup>s</sup>, personal computer<sup>s</sup>, portable telephone<sup>s</sup>, game machinery<sup>s</sup>, building ~~mate-~~<sup>materials</sup> rials, office supplies, stationery<sup>s</sup>, toys, sports goods, sports equipment, ~~agricul-~~<sup>agricultural</sup> tural tools and marine tools.

They ~~are~~<sup>these products</sup> usually prepared by plastic processing methods such as injection ~~mo-~~lding, blow molding, compression molding, transfer molding, rotating molding, slush molding, inflation tubular film process, and extrusion molding.

As plastics processing are conducted at high ~~temperature~~<sup>temperatures</sup> above 200°C, additives, monomers, decomposed materials in the plastics are changed to carbonized ~~mate-~~<sup>materials</sup> rials such as tar, pitch and other ~~colo-~~<sup>color</sup> rors colored.

ured sticky substances, which are apt to adhere to the surface of the screw, barrel and die of the plastic processing machine to cause transfer of the carbonized materials to the molded product.

The above mentioned transfer makes the surface of molded products dirty and makes the dimensions of the molded product inaccurate, resulting in failure to perform expected moving or structural functions, therefore cleaning the screw, barrel and die of the plastic processing machine has been required.

In case of production change from specific coloured molded articles to non-coloured or other coloured molded articles, cleaning the screw, barrel and die has been also required to avoid crosscontamination caused by remained specifically coloured resin compound. compound residue with

However, there are some problems on the conventional cleaning method of the screw, barrel and die.

One conventional cleaning method has been known as the method of dismantling the plastic processing machine, resulting in exposing the screw, barrel and die to the outside, then the carbonized material or coloured materials adhered to the surface of the screw, barrel and die are removed by using the separating tools such as knife.

However, this method has a defect of exposing operator to high temperatures and taking for long times, which often causes some of them suffering of skin burn operators to suffer burns

or electric shock.

In <sup>the</sup> case of ~~a~~ <sup>machines</sup> large <sup>sized</sup> size plastic <sup>processing</sup> ~~process~~ ~~ing machine~~, dismantling is impossible.

There ~~is~~ <sup>are</sup> known other conventional ~~cle~~ <sup>cleaning</sup> ~~aning method~~ <sup>methods</sup> in which ~~un~~ <sup>uncolored</sup> ~~coloured~~ thermo-thermoplastic plastic resin such as low density poly-polyethylene ethylene is passed through <sup>the</sup> inside of ~~the~~ plastic processing machine. <sup>machines</sup>

However ~~this method~~ <sup>such methods</sup> cannot remove contaminants entirely even if a lot of it used <sup>over extended times</sup>. ~~moreover, such methods generate~~ <sup>time has been spent and this method gen</sup> ~~erates~~ a large amount of mixed product consisting of contaminants and resin, which ~~scarcely~~ <sup>scarcely</sup> find use as ~~the~~ <sup>a</sup> ~~recycling~~ <sup>recycled</sup> resin compound.

~~The other~~ <sup>Another</sup> cleaning method ~~is the meth~~ <sup>involves the use of a</sup> ~~od of using the resin composition conta~~ <sup>containing</sup> ~~ining of an~~ <sup>calcium</sup> inorganic powder such as calcium carbonate which exerts improved ~~effe~~ <sup>effects</sup> ~~ct of removing coloured~~ <sup>on the removal of colored</sup> contaminants.

However, ~~it~~ <sup>this method</sup> causes new ~~problem~~ <sup>problems</sup> of ~~rem~~ <sup>the</sup> ~~aining~~ the inorganic power in the ~~plastic~~ <sup>plastic</sup> processing machine. <sup>remaining</sup>

Another cleaning method ~~also~~ has been attempted ~~by using~~ <sup>to use a</sup> resin composition consisting <sup>of</sup> a thermoplastic resin such as low density polyethylene and a surface active agent such as sodium stearate or polyoxyethylene nonylphenyl ether <sup>tension</sup> having the effect of lowering interface ~~tention~~. <sup>However,</sup> ~~but the coloured~~ <sup>colored</sup> contaminants ~~was~~ <sup>were</sup> scarcely removed.

Based on the above mentioned knowledge, new cleaning method <sup>have</sup> ~~has~~ been disclosed in ~~the~~ Japanese Kokai Patents (H2-180941 and H7-53774), in which ~~it is disclosed~~

a resin composition consisting of ~~uncolored~~ <sup>uncolored</sup> ~~thermoplastic~~ <sup>thermoplastic</sup> resin and <sup>a</sup> calcium salt of <sup>an</sup> organic boron compound having ~~an~~ <sup>an</sup> SP3 hybridization orbitals. <sup>this</sup> resin ~~composition~~ <sup>composition</sup> ~~which maintains a certain extent~~ <sup>properties</sup> of abrasive ~~property~~ <sup>amount</sup>.

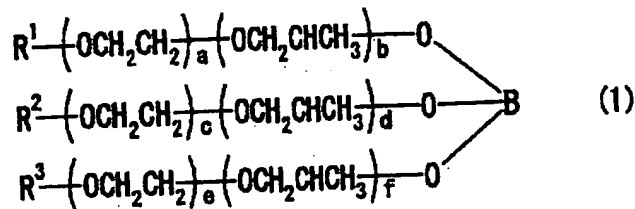
However, the method ~~is still~~ <sup>does</sup> not ~~excess~~ <sup>does</sup> exert ~~its~~ <sup>a</sup> sufficient effect of removing the ~~coloured contaminant~~ <sup>colored contaminants</sup>.

## SUMMARY OF THE INVENTION

As a result of diligent investigation <sup>during the course of</sup> ~~by~~ the present invention, ~~under such situation~~ <sup>the present invention provides a</sup> resin composition for purging away ~~contaminant~~ <sup>contaminates</sup> ~~in the plastic processing machine~~ <sup>machines</sup> ~~which resin composition comprises~~ <sup>which resin composition comprises</sup> a thermoplastic resin and a specific borate ester of ~~polyoxyalkylene~~ <sup>polyoxyalkylene</sup> ~~and a purging method of contaminant~~ <sup>purging contaminants</sup> ~~in the plastic processing machine~~ <sup>machines</sup> ~~by passing said resin composition through~~ <sup>through the</sup> ~~inside of the plastic processing machine~~ <sup>machines</sup> ~~machines~~ <sup>involves</sup>.

## DETAILED DESCRIPTION OF THE INVENTION

<sup>The</sup> A borate ester of polyoxyalkylene <sup>chemical</sup> used for the present invention is a ~~chemical~~ <sup>chemical</sup> compound expressed by the following ~~following~~ <sup>following</sup> general formula (1).

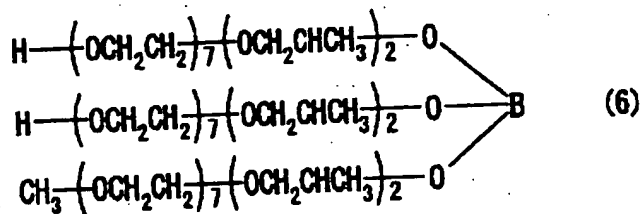
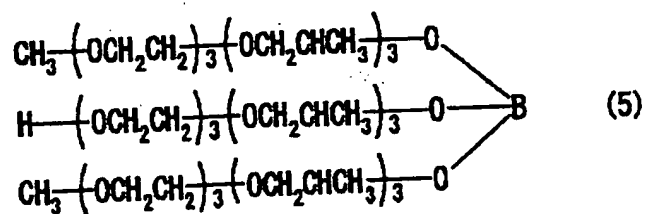
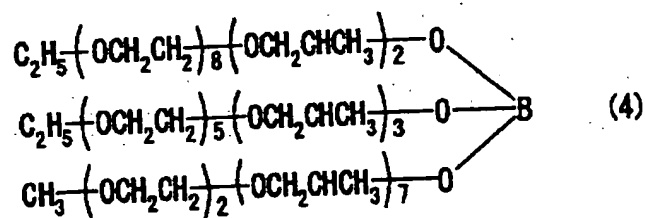
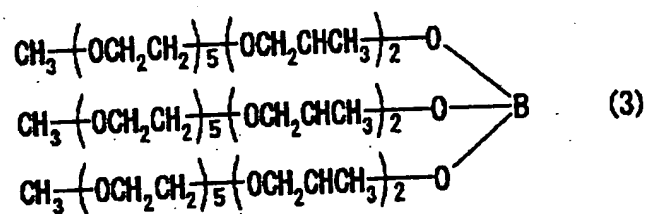
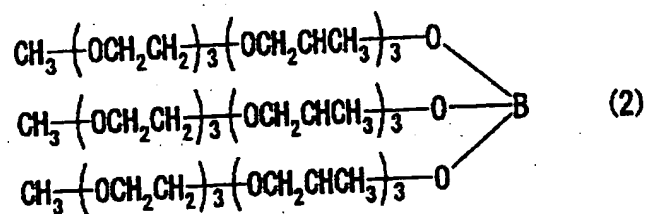


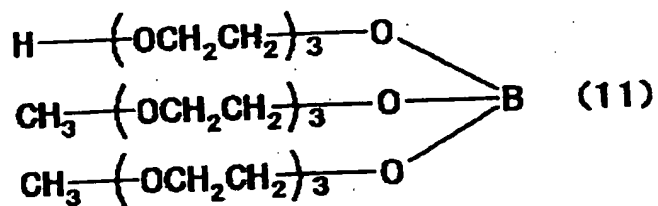
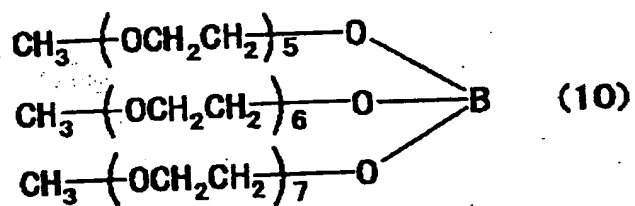
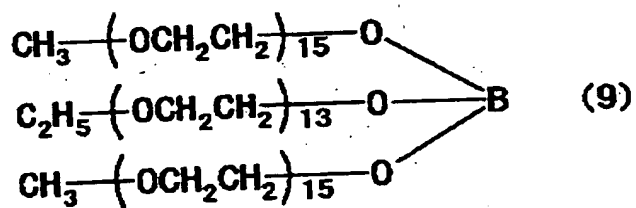
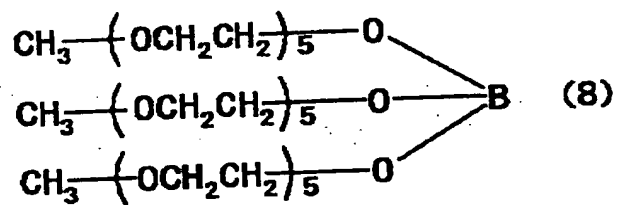
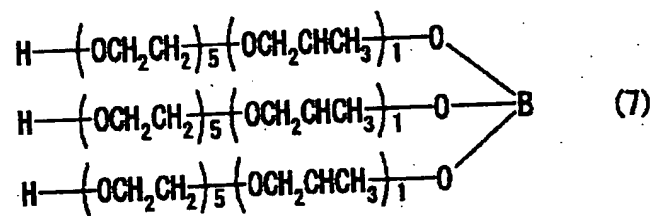
wherein  $R^1$ ,  $R^2$  and  $R^3$  are independently selected from <sup>the</sup> group consisting of ~~hydro-~~ <sup>hydrogen</sup> ~~gen and hydrocarbon group~~ <sup>hydrocarbons</sup>,  $a$ ,  $b$ ,  $c$ ,  $d$ ,  $e$  and  $f$  are positive integers independently <sup>selected</sup> from 0 to 30 whose sum is from 6 to 80.

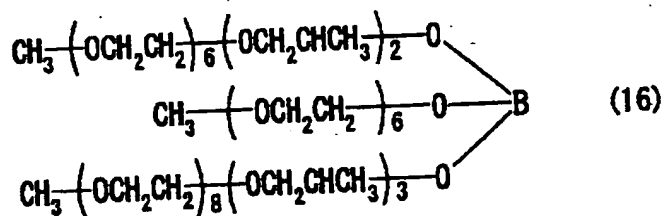
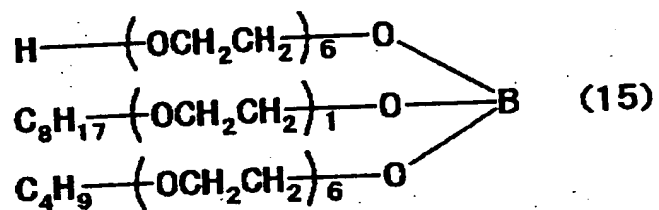
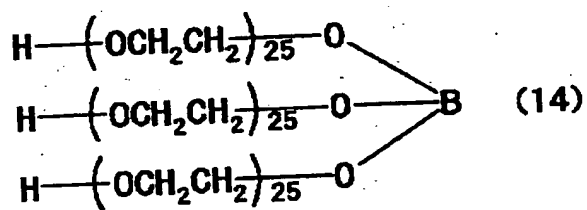
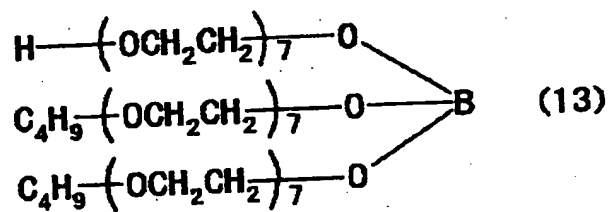
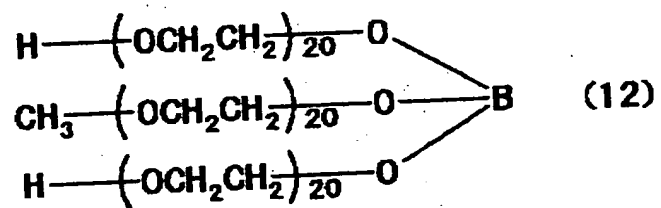
<sup>Examples</sup> of the ~~hydrocarbon~~ <sup>hydrocarbons</sup> group are alkyl groups such as methyl, ethyl, ~~prop-~~ <sup>propyl</sup>, ~~yl~~, isopropyl, <sup>butyl</sup>, <sup>pentyl</sup>, hexyl, ~~octyl~~ <sup>octyl</sup>, nonyl, decyl, dodecyl, hexadecyl, octadecyl and docosyl groups and phenyl, tolyl and cyclohexyl ~~group~~ <sup>groups</sup>.

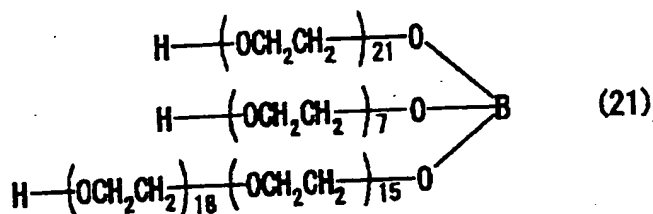
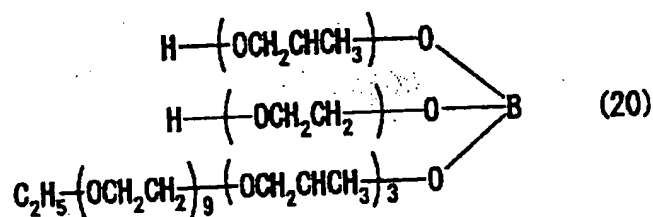
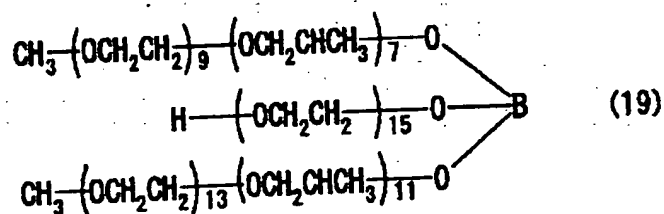
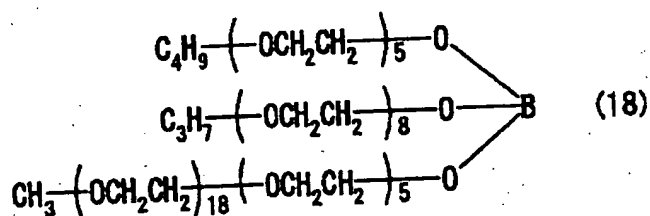
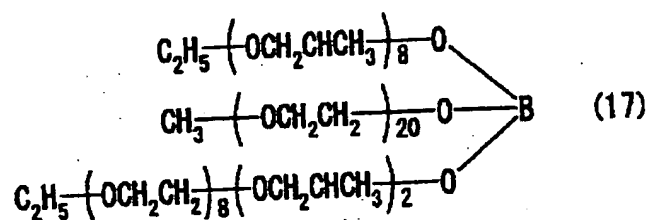
Illustrative of the borate ~~ester~~ <sup>ester</sup> of polyoxyalkylene are the chemical compound expressed by the following chemical formula from (2) to (27).

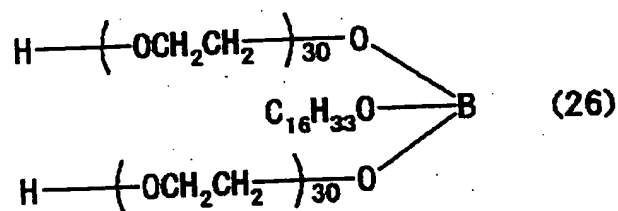
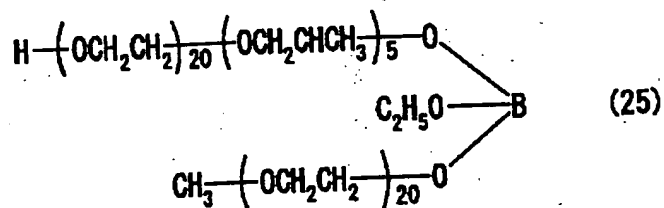
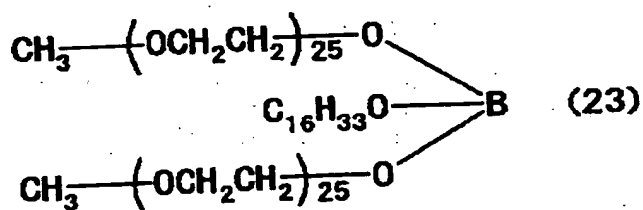
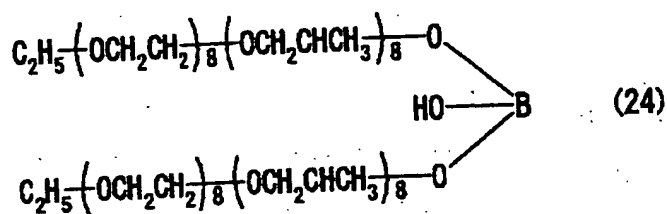
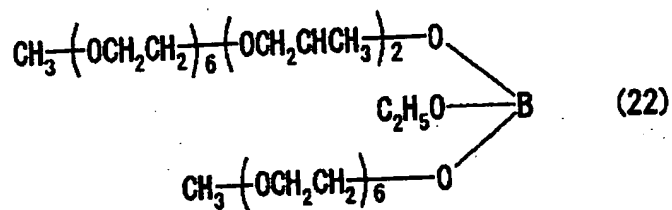


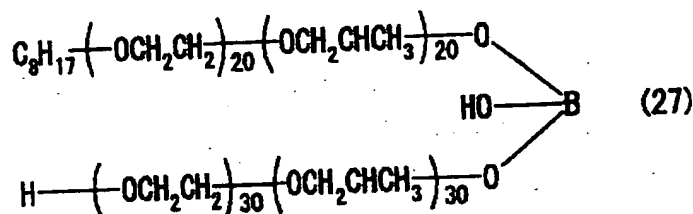












Production ~~method~~ <sup>methods</sup> for <sup>the</sup> borate esters of polyoxyalkylene used for ~~the~~ <sup>the</sup> present ~~in~~ <sup>invention</sup> ~~vention~~ are not limited to ~~any~~ <sup>any</sup> specific ~~met-~~ <sup>preferred.</sup>

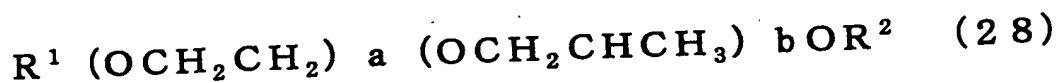
~~method, however, but~~ <sup>the</sup> following method is ~~preferable.~~

The borate esters of polyoxyalkylene are produced by ~~esterification-dehydration~~ <sup>esterification-dehydration</sup> ~~ion~~ or ester-exchange reaction by ~~contacting~~ <sup>contacting</sup> polyoxyalkylene expressed by the chemical formula (28) with boric acid or borate esters of lower ~~alcohol~~ <sup>alcohols</sup> such as methyl alcohol or ethyl alcohol.

It is ~~preferable~~ <sup>preferable</sup> that <sup>the</sup> reaction is ~~carried~~ <sup>carried</sup> out ~~by~~ using 1 mol of boric acid or borate esters of lower ~~alcohol~~ <sup>alcohols</sup> with from 3 to 3.5 moles of polyoxyalkylene ~~expressed~~ <sup>expressed</sup> by the chemical ~~formula~~ <sup>formula</sup> (28).

If the mole ratio is less than 3, ~~is not preferable because~~ undesirable byproducts of borate esters having two or three boron atoms are generated.

The other byproducts or unreacted ~~polyoxyalkylene~~ <sup>polyoxyalkylene</sup> may be remained in the borate esters unless they ~~do not~~ <sup>do not</sup> hinder the purging effect of the resin ~~composition~~ <sup>compositions</sup> of the present invention.



wherein  $R^1$  and  $R^2$  are independently ~~selected~~<sup>selected</sup> from ~~the~~<sup>hydrocarbons</sup> group consisting of hydrogen and hydrocarbon group, ~~a~~<sup>hydrocarbons</sup> and ~~b~~<sup>hydrocarbons</sup> are independently ~~selected~~<sup>selected</sup> from 0 to 30.

~~Examples~~<sup>Examples</sup> of the ~~hydrocarbon group~~<sup>hydrocarbons</sup> are alkyl groups such as methyl, ethyl, ~~propyl~~<sup>propyl</sup>, isopropyl, ~~butyl~~<sup>butyl</sup>, pentyl, hexyl, octyl, nonyl, decyl, dodecyl, hexadecyl, octadecyl and docosyl groups and phenyl, tolyl and cyclohexyl groups.

~~Examples~~<sup>Examples</sup> of the polyoxyalkylene ~~expressed~~<sup>expressed</sup> by the chemical formula (28) are as follows:

diethylene glycol monomethyl ether,  
diethylene glycol monoethyl ether,  
diethylene glycol monoisopropyl ether,  
diethylene glycol monobutyl ether,  
diethylene glycol monooctyl ether,  
diethylene glycol monodecyl ether,  
diethylene glycol monohexadecyl ether,  
diethylene glycol monooctadecyl ether,

triethylene glycol monomethyl ether,  
triethylene glycol monoethyl ether,  
triethylene glycol monoisopropyl ether,  
triethylene glycol monobutyl ether,  
triethylene glycol monooctyl ether,  
triethylene glycol monodecyl ether,  
triethylene glycol monohexadecyl ether,  
triethylene glycol monooctadecyl ether,

tetraethylene glycol monomethyl ether,  
tetraethylene glycol monoethyl ether,  
tetraethylene glycol monoisopropyl ether,  
tetraethylene glycol monobutyl ether,

tetraethylene glycol monoethyl ether,  
tetraethylene glycol monodecyl ether,  
tetraethylene glycol monohexadecyl ether,  
tetraethylene glycol monoctadecyl ether,

polyethylene glycol monomethyl ether,  
polyethylene glycol monoethyl ether,  
polyethylene glycol monoisopropyl ether,  
polyethylene glycol monobutyl ether,  
polyethylene glycol monoethyl ether,  
polyethylene glycol monodecyl ether,  
polyethylene glycol monohexadecyl ether,  
polyethylene glycol monoctadecyl ether,

dipropylene glycol monomethyl ether,  
dipropylene glycol monoethyl ether,  
dipropylene glycol monoisopropyl ether,  
dipropylene glycol monobutyl ether,  
dipropylene glycol monoethyl ether,  
dipropylene glycol monodecyl ether,  
dipropylene glycol monohexadecyl ether,  
dipropylene glycol monoctadecyl ether,

tripropylene glycol monomethyl ether,  
tripropylene glycol monoethyl ether,  
tripropylene glycol monoisopropyl ether,  
tripropylene glycol monobutyl ether,  
tripropylene glycol monoethyl ether,  
tripropylene glycol monodecyl ether,  
tripropylene glycol monohexadecyl ether,  
tripropylene glycol monoctadecyl ether,

tetrapropylene glycol monomethyl ether,  
tetrapropylene glycol monoethyl ether,  
tetrapropylene glycol monoisopropyl  
ether,



tetrapropylene glycol monobuthyl ether,  
tetrapropylene glycol monoocthyl ether,  
tetrapropylene glycol monodecyl ether,  
tetrapropylene glycol monohexadecyl  
ether,  
tetrapropylene glycol monooctadecyl  
ether,

polypropylene glycol monomethyl ether,  
polypropylene glycol monoethyl ether,  
polypropylene glycol monoisopropyl ether,  
polypropylene glycol monobuthyl ether,  
polypropylene glycol monoocthyl ether,  
polypropylene glycol monodecyl ether,  
polypropylene glycol monohexadecyl ether,  
polypropylene glycol monooctadecyl ether,

diethyleneglycol tripropyleneglycol  
monomethyl ether,  
tetraethyleneglycol dipropyleneglycol  
monomethyl ether,  
tetraethyleneglycol tripropyleneglycol  
monomethyl ether,  
tetraethyleneglycol tetrapropyleneglycol  
monomethyl ether,  
pentaethyleneglycol dipropyleneglycol  
monomethyl ether,  
pentaethyleneglycol tripropyleneglycol  
monomethyl ether,  
diethyleneglycol tetrapropyleneglycol  
monomethyl ether,

hexaethyleneglycol dipropyleneglycol  
monomethyl ether,  
hexaethyleneglycol dipropyleneglycol  
monomethyl ether,

hexaethyleneglycol tripropyleneglycol  
monomethyl ether,  
hexaethyleneglycol tetrapropyleneglycol  
monomethyl ether,  
hexaethyleneglycol pentapropyleneglycol  
monomethyl ether,  
hexaethyleneglycol hexapropyleneglycol  
monomethyl ether,

heptaethyleneglycol dipropyleneglycol  
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heptaethyleneglycol dipropyleneglycol  
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heptaaethyleneglycol hexapropyleneglycol  
monomethyl ether,  
heptaaethyleneglycol heptapropylenegly-  
col monomethyl ether,

octaethyleneglycol dipropyleneglycol  
monomethyl ether,  
octaethyleneglycol tripropyleneglycol  
monomethyl ether,  
octaethyleneglycol tetrapropyleneglycol  
monomethyl ether,  
octaethyleneglycol pentapropyleneglycol  
monomethyl ether,  
octaethyleneglycol hexapropyleneglycol  
monomethyl ether,  
octaethyleneglycol heptapropyleneglycol  
monomethyl ether,

polyethyleneglycol polypropyleneglycol  
monomethyl ether,

triethylene glycol, ✓  
tetraethylene glycol, ✓  
pentaethylene glycol, ✓  
hexaethylene glycol, ✓  
heptaethylene glycol, ✓  
octaethylene glycol, ✓  
decaethylene glycol, ✓  
tridecaethylene glycol, ✓  
hexadecaethylene glycol, ✓  
eicosaethylene glycol, ✓  
pentacosaeethylene glycol, ✓  
triacosaethylene glycol, ✓

tripropylene glycol, ✓  
tetrapropylene glycol, ✓  
pentapropylene glycol, ✓  
hexapropylene glycol, ✓  
heptapropylene glycol, ✓  
octapropylene glycol, ✓  
decapropylene glycol, ✓  
tridecapropylene glycol, ✓  
hexadecapropylene glycol, ✓  
eicosapropylene glycol, ✓  
pentacosapropylene glycol, ✓  
triacosapropylene glycol, ✓

triethylene glycol tripropylene glycol,  
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tetraethylene glycol tripropylene glycol,  
tetraethylene glycol tetrapropylene  
glycol,  
pentaethylene glycol dipropylene glycol,  
pentaethylene glycol tripropylene glycol,

hexaethylene glycol dipropylene glycol,  
hexaethylene glycol tripropylene glycol,  
hexaethylene glycol pentapropylene  
glycol,  
hexaethylene glycol hexapropylene glycol,  
heptaethylene glycol dipropylene glycol,  
triaecosaethylene glycol dipropylene  
glycol,

heptaethylene glycol tripropylene glycol,  
heptaethylene glycol tetrapropylene  
glycol,  
heptaethylene glycol pentapropylene  
glycol,  
heptaethylene glycol hexapropylene  
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octaethylene glycol dipropylene glycol,  
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octaethylene glycol pentapropylene  
glycol,  
octaethylene glycol hexapropylene glycol,  
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glycol,  
octaethylene glycol octapropylene glycol,  
polyethylene glycol polypropylene glycol,

tripropylene glycol triethylene glycol  
monomethyl ether,  
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monomethyl ether,  
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tetrapropylene glycol tetraethylene  
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hexapropylene glycol diethylene glycol  
monomethyl ether,  
hexapropylene glycol triethylene glycol  
monomethyl ether,  
hexapropylene glycol tetraethylene  
glycol monomethyl ether,  
hexapropylene glycol pentaethylene  
glycol monomethyl ether,  
hexapropylene glycol hexaethylene glycol  
monomethyl ether,

heptapropylene glycol diethylene glycol  
monomethyl ether,  
heptapropylene glycol triethylene glycol  
monomethyl ether,  
heptapropylene glycol tetraethylene  
glycol monomethyl ether,  
heptapropylene glycol pentaethylene  
glycol monomethyl ether,  
heptapropylene glycol hexaethylene  
glycol monomethyl ether,  
heptapropylene glycol heptaethylene  
glycol monomethyl ether

octapropylene glycol diethylene glycol  
monomethyl ether,

octapropylene glycol triethylene glycol  
monomethyl ether,  
octapropylene glycol tetraethylene  
glycol monomethyl ether,  
octapropylene glycol pentaethylene  
glycol monomethyl ether,  
octapropylene glycol hexaethylene glycol  
monomethyl ether,  
octapropylene glycol heptaethylene  
glycol monomethyl ether  
octapropylene glycol octaethylene glycol  
monomethyl ether  
polypropylene glycol polyethylene glycol  
monomethyl ether

tripropylene glycol triethylene glycol  
monomethyl ether,  
tetrapropylene glycol triethylene glycol  
monomethyl ether,  
tripropylene glycol triethylene glycol  
monomethyl ether,  
octapropylene glycol diethylene glycol  
monomethyl ether,

octaethylene glycol dipropylene glycol  
monomethyl ether,  
octaethylene glycol tripropylene glycol  
monomethyl ether,  
octaethylene glycol tetrapropylene  
glycol monomethyl ether,  
octaethylene glycol pentapropylene  
glycol monomethyl ether,  
octaethylene glycol hexapropylene glycol  
monomethyl ether,  
octaethylene glycol heptapropylene  
glycol monomethyl ether,

octaethylene glycol octapropylene glycol  
monomethyl ether,  
polyethylene glycol polypropylene glycol  
monomethyl ether.

A solvent or diluent may be ~~incorpora-~~  
~~ted~~ into the raw materials such as boric  
acid, borate <sup>ester</sup> of lower <sup>alcohol</sup> and  
polyoxyalkylene, or into borate esters  
of glycol ether.

If ~~the~~ <sup>a</sup> solvent or diluent <sup>is</sup> ~~are~~ employed,  
they must not disturb the ~~esterification~~ <sup>esterification-dehydration</sup>  
~~dehydration~~ or ester-exchange reaction  
and their boiling <sup>point(s)</sup> ~~point~~ <sup>should</sup> be preferable  
~~below~~ <sup>be below</sup> the boiling point of the ~~by-pro-~~  
~~ducts~~ or polyoxyalkylenes. <sup>byproducts</sup>

<sup>Examples</sup> ~~Example~~ of ~~the~~ <sup>solvents</sup> or <sup>dilvents</sup> ~~diluent~~ are  
ethers such as diethyl ether, dioxane,  
tetrahydrofran; aliphatic hydrocarbons  
such as hexane, acetic anhydride, ~~hepta-~~ <sup>heptane</sup>  
~~ne~~ octane, nonane, decane, undecane;  
aromatic hydrocarbons such as benzene, <sup>cycloalkanes</sup> ~~cycloalkane~~ such as <sup>cyclohexane</sup> ~~cy-~~  
~~clohexane~~, cyclohexene; non-proton polar  
<sup>compounds</sup> ~~compounds~~ such as dimethy formamide, ~~di-~~ <sup>dimethyl</sup>  
~~methyl~~ sulfoxide, hexamethyl polyamide  
phosphate, acetonitrile, N-methyl ~~pyrro-~~ <sup>pyrrolidone</sup>  
~~lidone~~; and their chlorine substituted  
<sup>compounds</sup> ~~compound~~ such as chloroform and carbon  
tetrachloride.

<sup>catalyst</sup> ~~A catalysts~~ for the ~~esterification-~~ <sup>esterification-dehydration</sup>  
~~dehydration~~ or ester-exchange reaction  
may be used. <sup>catalyst</sup> ~~is~~

If ~~the~~ <sup>a</sup> ~~catalysts~~ <sup>are</sup> necessary for <sup>condensation</sup> ~~conde-~~  
~~nsation~~ catalysts are recommended.

~~Example~~ of ~~the~~ catalysts are metallic

<sup>Examples</sup>

<sup>salts</sup> ~~salt~~ of organic <sup>acids</sup> ~~acid~~ such as ferrous <sup>octanoate</sup> ~~ac-~~  
~~tanoate~~, ferrous naphthenate, cobaltous  
naphthenate, manganese octanoate, ~~stann~~ <sup>stannum</sup>  
~~um~~ octanoate, stannum naphthenate, lead  
octanoate, lead naphthenate, organotin  
<sup>compounds</sup> ~~compound~~ such as <sup>dibutyl</sup> ~~dibutyl~~ tin diacetate,  
<sup>dibutyl</sup> ~~dibutyl~~ tin dioctanoate, dibutyl tin  
dilaurate, <sup>dibutyl</sup> ~~dibutyl~~ tin dioleate, dibutyl  
tin dimethoxide, oxidized dibutyl tin;  
metal <sup>alcoholates</sup> ~~alcoholate~~ such as tetrabutyl  
titanate, tetrabutyl zirconate; titanium  
<sup>chelates</sup> ~~chelate~~ such as di-isopropoxy bis-acetyl  
acetate titanium, 1, 3-propanedioxy  
bis-ethylacetate titanium, 1, <sup>3-propanedioxy</sup> ~~3-propa-~~  
~~nedioxy~~ bis-ethylacetoacetate titanium;  
<sup>aluminum chelates</sup> ~~aluminum chelate~~ such as <sup>aluminum acetylacetonate</sup> ~~aluminum acetyl-~~  
~~acetate~~, <sup>aluminum</sup> ~~aluminum~~ tris-ethylacetoaceto-  
~~nate~~; amines such as hexyl amine, dodec-  
<sup>dodecylamine</sup> ~~ylamine~~ phosphate, dimethyl hydroxyamine,  
diethyl hydroxyamine; tetra-ammonium  
<sup>salts</sup> ~~salt~~ such as benzyl hydroxyamine; inorg-  
<sup>acids</sup> ~~anic acid~~ such as <sup>hydrochloric</sup> ~~hydrochloric~~ acid,  
nitric acid, <sup>sulfuric</sup> ~~sulfuric~~ acid, phosphoric  
acid; organic <sup>acids</sup> ~~acid~~ such as acetic <sup>anhydride</sup> ~~anhyd-~~  
~~ride~~, pure acetic acid (over 99.8%), <sup>propionic</sup> ~~pro-~~  
~~pionic~~ acid, citric acid, benzoic acid,  
formic acid, acetic acid, oxalic acid,  
p-toluenesulfonic acid; <sup>chlorosilanes</sup> ~~chlorosilane~~  
such as methyl tri-chlorosilane, dimeth-  
yl di-chlorosilane; inorganic <sup>bases</sup> ~~base~~ such  
as aqueous ammonia; organic <sup>bases</sup> ~~base~~ such as  
ethylene diamine, tri-ethanol amine; and  
amino alkylamine.

It is preferable that the <sup>esterification-dehydration</sup> ~~esterification~~  
~~ion-dehydration~~ or ester-exchange reac-  
tion is carried out under ~~the~~ conditions



of at reduced or atmospheric pressure, <sup>pressures and at a temperature of</sup>  
from 50 to 250°C, <sup>and preferably</sup> ~~temperature, favorably~~  
from 100 to 180°C.

~~Under the reaction, removal of byprod-~~  
~~ucts such as lower alcohol or water can~~  
~~proceed the reaction easily because removal~~  
~~of byproducts proceeds the reaction~~  
~~equilibrium to favorable direction of~~  
~~borate ester of polyoxyalkylenes format-~~  
~~ion.~~ <sup>formation</sup>

As to the removal <sup>methods</sup> ~~method~~, azeotropic  
distillation using <sup>an</sup> azeotropic agent and  
batch or continuous distillation using  
a distillation tower are preferable. <sup>properties</sup>

For the purpose of improving the ~~prop-~~  
~~erties~~ of the borate ester of polyoxya-  
<sup>polyoxyalkylenes</sup> ~~kylenes~~, amino group containing <sup>compounds</sup> ~~compound~~  
and/or <sup>solved</sup> ~~solvent~~ may be added to said ~~borate~~  
~~te~~ esters of polyoxyalkylenes.

Adding the amino group containing <sup>compounds</sup> ~~com-~~  
~~pound~~ to the borate <sup>ester</sup> ~~ester~~ of <sup>polyoxyalkylenes</sup> ~~polyoxya-~~  
~~kylenes~~ exhibits <sup>suppresses</sup> ~~the~~ suppressing of bor-  
~~ate~~ ester hydrolysis and also <sup>provides</sup> ~~exhibits~~  
a rust preventive effect under the <sup>conditions</sup> ~~condit-~~  
<sup>the presence</sup> ~~ion of existence~~ of water or its vapor.

Examples of the amino-group containing <sup>compounds</sup> ~~compound~~ include alkylamine, <sup>cycloalkylamine</sup> ~~cycloalkyl~~  
amine, alkanol amine, heterocyclic amine,  
diamine, lactam, cyclic imide and <sup>polyamine</sup> ~~poly-~~  
amine, which may be used alone or ~~combi-~~ <sup>combination</sup>  
~~nation, selecting from these compound~~

As the alkyl amine, there can be used  
methyl amine, dimethyl amine, trimethyl  
amine, ethyl amine, diethyl amine, tri-  
ethyl amine, propyl amine, N, N-di[poly(4)  
oxyethyl] hexadecyl amine, dodecyl dime-

thyl amine, stearamide propyl dimethyl amine, polyoxyethylene (3-30) octadecyl amine, polyoxyethylene (3-30) lauryl amine, polyoxyethylene (3-30) oleyl amine, ~~polyoxyethylene (3-30) dilauryl amine, polyoxyethylene (3-30) stearyl amine, polyoxyethylene (3-30) alkylamine, polyoxyethylene (3-30) dialkyl amine, and di (oleoxyloxyethyl) hydroxy amine.~~

As the cycloalkyl amine, there can be used cyclohexyl amine, methyl ~~cyclohexyl~~ <sup>cyclohexylamine</sup> amine and ethyl cyclohexyl amine.

As the alkanol amine, there can be use ~~methanol amine, diethanol amine, dimethyl amine, triethanol amine, propanolamine, dimethyl 2-hydroxypropyl amine, butanol amine, methyldi (2-hydroxyethyl) amine, tri (2-hydroxyethyl) amine, hydroxymethyl di (2-hydroxyethyl) amine, dibenzyl~~ <sup>2-hydroxypropyl</sup> ~~2-hydroxypropyl amine and cyclohexyl di (2-hydroxyethyl) amine.~~ <sup>2-hydroxyethyl</sup>

As the cycloalkanol amine, there can be used cyclohexanol amine, methyl ~~cyclohexanol~~ <sup>methylcyclohexanol</sup> amine and ethylcyclohexanol amine.

As the heterocyclic amine, there can be used ~~used~~ pyridine, lutidine, 3, 4-xylidine, piperidine, N-methyl piperidine and N-ethyl piperidine.

As the lactam, there can be used propio lactam, N-methylpropio lactam, N-ethyl ~~buthyro~~ <sup>butyrolactam</sup> lactam, N-methyl varero lactam, N-methyl caprolactam and phenyl caprolactam.

As the cyclic imide, there can be used

succinimide, N-methyl succinimide, N-ethyl succinimide, phenyl succinimide and 2-undecyl imidazoline.

As the diamine, there can be used ethylene diamine, triethylene diamine and tetraethylene diamine.

As the polyamine, there can be used diethylene triamine, triethylene tetra-~~mine~~ and pentaethylene pentamine.

Among these ~~amino-group~~ <sup>amino-group</sup> containing ~~com-~~ <sup>compounds</sup> pound, tertiary ~~amino-group~~ <sup>amino-group</sup> containing ~~com-~~ <sup>compounds</sup> exhibit excellent ~~effect~~ <sup>effects</sup> of preventing hydrolysis of borate ester of polyoxyalkylene and promoting the ~~clea-~~ <sup>cleaning</sup> ning and purging the coloured ~~contamina-~~ <sup>contaminants</sup> nts.

<sup>Examples</sup> Example of tertiary ~~amino-group~~ <sup>amino-group</sup> containing ~~com-~~ <sup>compounds</sup> having <sup>the</sup> above mentioned excellent properties are polyoxyethylene (3-30) octadecyl amine, polyoxyethylene (3-30) laurylamine, polyoxyethylene (3-30) dilauryl amine, polyoxyethylene (3-30) stearyl amine, polyoxyethylene (3-30) alkylamine, polyoxyethylene (3-30) dialkyl amine and di(oleoyloxyethyl) hydroxy amine.

The amount of ~~amino-group~~ <sup>amino-group</sup> containing ~~com-~~ <sup>compounds</sup> pound to 100 parts by weight of ~~bora-~~ <sup>borate</sup> te ester of polyoxyalkylene is from 0 to 100 parts by weight, ~~favourably~~ <sup>and preferably</sup> from <sup>5</sup> to 50 parts by weight and most ~~favourably~~ <sup>preferably</sup> from 10 to 30 parts by weight.

Use of <sup>a</sup> ~~the~~ solvent contributes to lower viscosity of the borate ester of polyoxyalkylene.

As <sup>a</sup> ~~the~~ solvent, there can be used

water, methyl alcohol, ethyl alcohol, isopropyl alcohol, butyl alcohol, ~~isopropyl~~ <sup>isopropyl</sup> ether, ether, ethylene glycol, ~~polyethylene glycol~~ <sup>polyethylene glycol</sup>, polyethylene dimethyl ester, diethylene glycol, triethylene glycol, ethylene glycol dimethyl ether, ~~diethylene glycol dimethyl ether~~ <sup>diethylene glycol</sup>, ~~diethylene glycol diethyl ether~~ <sup>diethylene glycol</sup>, ethylene glycol dipropyl ether, triethylene glycol dimethyl ether, triethylene glycol ~~monobutyl~~ <sup>monobutyl</sup> ether, diethylene glycol ~~monobutyl~~ <sup>monobutyl</sup> ether, diethylene glycol diethyl ether, diethylene glycol propyl ether, diethylene glycol ~~dibutyl~~ <sup>dibutyl</sup> ether, ~~dimethyl ether~~ <sup>dimethyl</sup>, propylene glycol, acetone, methylethyl ketone, furfural, dioxane, methane sulfonate, diethyl ether, tetrahydrofuran, hexane, acetic anhydride, ~~undecane~~ <sup>undecane</sup>, heptane, octane, nonane, decane, ~~undecane~~ <sup>cyclohexane</sup>, benzene, toluene, xylene, ~~cyclohexane~~ <sup>cyclohexane</sup>, cyclohexene, dimethyl formamide, dimethyl sulfoxide, hexamethyl triamide phosphate, acetonitrile, N-methyl ~~pyrrolidone~~ <sup>pyrrolidone</sup>, chloroform and carbon ~~tetrachloride~~ <sup>tetrachloride</sup> and the solvents are used by alone or combination.

The amount of solvent to 100 parts by total weight of borate ester of ~~polyoxyalkylene~~ <sup>polyoxyalkylene</sup> and ~~amino-group~~ <sup>amino-group</sup> containing ~~compounds~~ <sup>compounds</sup> ~~are~~ <sup>are</sup> from 0 to 100 parts by weight, ~~favourably~~ <sup>and preferably</sup> from 5 to 50 parts by weight and most ~~favourably~~ <sup>preferably</sup> from 10 to 30 parts by weight.

~~The other ingredient~~ <sup>Ingredients</sup> other than ~~amino-group containing compound~~ <sup>the amino-group containing compounds</sup> and/or solvent may be incorporated to borate ester of ~~solvents~~ <sup>into</sup>

polyoxyalkylene for the purpose of ~~impr-~~<sup>improving</sup> the properties of cleaning and purging <sup>the</sup> resin compound ~~of~~<sup>at</sup> the present invention.

As ~~the~~<sup>for</sup> other ~~ingredient~~<sup>ingredients</sup>, there can be used stabilizer<sup>s</sup>, neutralizer<sup>s</sup>, ~~antioxidant~~<sup>antioxidants</sup>, ultraviolet absorber<sup>s</sup>, light stabilizer<sup>s</sup>, antistatic agent<sup>s</sup>, lubricant<sup>s</sup>, ~~processability~~<sup>processability</sup> improving agent<sup>s</sup>, filler<sup>s</sup>, ~~dispersing~~<sup>dispersing</sup> agent<sup>s</sup>, coupling agent<sup>s</sup>, ~~anticopper~~<sup>anti-copper</sup> rusting agent<sup>s</sup>, blowing agent<sup>s</sup>, nuclear forming agent<sup>s</sup>, ~~anti-forming~~<sup>anti-forming</sup> agent<sup>s</sup>, ~~deformer~~<sup>deformers</sup>, ~~colorant~~<sup>colorants</sup>, pigment<sup>s</sup>, ~~dyeing~~<sup>dyeing</sup> agent<sup>s</sup>, carbon black, water tree preventing agent<sup>s</sup>, voltage stabilizer<sup>s</sup>, ~~anti-tracking~~<sup>anti-tracking</sup> agent, organic peroxide, crosslinking agent<sup>s</sup>, disinfectant<sup>s</sup>, antiseptics, ~~anti-~~<sup>anti-mold</sup> mold agents<sup>s</sup> and ~~anti-rust~~<sup>anti-rust</sup> agent<sup>s</sup>.

In the present invention, the resin composition for purging ~~contaminant~~<sup>contaminants</sup> means ~~the~~<sup>a</sup> resin composition which is fed from ~~hopper~~<sup>a</sup> to inside ~~vacancy~~<sup>vacancy</sup> of ~~the~~<sup>the</sup> plastic processing machine to fill the ~~vacancy~~<sup>plastic processing machine</sup> with the resin composition.

The ~~vacancy~~<sup>vacancy</sup> of plastic processing ~~a production~~<sup>a production</sup> machine had ~~been~~<sup>previously</sup> filled with ~~other~~<sup>resin</sup> resin composition for producing ~~the~~<sup>the</sup> plastic mold or film and the ~~surface~~<sup>surface</sup> of screw barrel and die had ~~been~~<sup>become</sup> stuck with the ~~coloured~~<sup>colored</sup> sticky contaminant formed by decomposition of the ~~resin~~<sup>resin</sup>.

In case of long time operation or ~~the~~<sup>when</sup> resin composition ~~changing~~<sup>compositions are changed</sup> for producing other sort of plastic article, ~~remained~~<sup>remained</sup> resin composition used for previous product and the ~~contaminant~~<sup>contaminants</sup> caused by

long time operation must be purged <sup>before</sup> for  
new plastic article production <sup>holder</sup> to ~~prevent~~ <sup>prevent</sup>  
~~at cross-contamination.~~ <sup>used</sup>

The resin composition <sup>used</sup> for purging ~~con-~~ <sup>contaminants</sup>  
~~taminant~~ and ~~remained~~ <sup>residual</sup> previously used  
resin composition <sup>composition(s)</sup> is fed <sup>into</sup> plastic  
processing machine after previous ~~plast-~~ <sup>plastic</sup>  
~~ic~~ article production is over.

The resin composition <sup>used</sup> for purging may  
be continuously fed <sup>into the processing machine</sup> or stopped after the  
~~resin composition is filled the vacancy~~ <sup>machine is filled.</sup>  
~~of the plastic processing machine.~~

After the resin composition <sup>used</sup> for purg-  
~~ing is filled,~~ <sup>the processing machine is filled with the</sup> then switch off the heat  
<sup>is switched off</sup> source <sup>purging</sup> and ~~lower~~ the machine temperature is lowered  
to room temperature and ~~leaves~~ the resin  
composition <sup>remains in the processing machine</sup> as it is for sufficient time  
such as from 6 to 48 hours to contact <sup>previously</sup>  
with contaminants and residue of ~~previo-~~ <sup>production</sup>  
~~usly used~~ resin composition <sup>composition(s).</sup>

When the next plastic mold or film <sup>composition</sup>  
will be produced, the new <sup>production</sup> resin ~~composi-~~  
tion for next plastic mold or film will  
be fed into the plastic processing ~~mach-~~ <sup>machine;</sup>  
~~ine,~~ <sup>Then any</sup> ~~then the~~ <sup>remaining</sup> ~~remained~~ <sup>purge</sup> resin comp- ~~composition~~  
~~osition absorbed~~ <sup>having</sup> with contaminant will be  
~~exhausted~~ <sup>absorbed there in</sup> purged.

The resin used for the resin ~~composit-~~ <sup>composition</sup>  
~~ion~~ of present invention is the ~~thermo-~~ <sup>thermoplastic</sup>  
~~plastic~~ resin.

As the thermoplastic resin, there can  
be used high density polyethylene, high  
pressure low density polyethylene such  
as HP-LDPE, EVA, EEA, Ionomer, olefin  
vinylalcohol copolymer, LLDPE, VLDPE,  
polypropylene (PP), ~~polystyrene~~ <sup>polystyrene</sup> (PS),

~~acrylonitrile-butadiene-styrene copolymer~~ <sup>styrene copolymer</sup>  
~~mer (ABS), acrylonitrile-styrene copolymer~~ <sup>styrene</sup>  
 (AS), acrylonitrile-butadiene copolymer,  
 acrylonitrile acrylate-styrene copolymer,  
 polyvinyl chloride (PVC), polyamide, ~~poly-~~  
<sup>polymethyl methacrylate</sup> ~~methylemethacrylate~~ (PMMA), polyacetal (POM),  
 aminopolyacrylamide, polyarylate, fluoro  
 carbon resin, polyimide (PI), <sup>polyaminobismaleimide</sup> ~~polyamino-~~  
~~bismaleimide~~ (PABI), polyamideimide (PAI),  
 polyetherimide (PEI), bismaleimidetriazine  
 resin (BT), polysulfone, polybutylene  
 terephthalate (PBT), polyethylene <sup>terephthalate</sup> ~~tereph-~~  
~~thalate~~ (PET), polyvinylidene chloride,  
 polycarbonate (PC), polyvinyl acetate,  
 polyvinyl alcohol, polyvinyl ether,  
 polyvinyl formale, modified PPE, ~~modifi-~~  
~~ed~~ polyphenyleneoxide (PPO), polyphenylene  
 sulfide (PPS), polyethersulfone (PESF),  
 polyetheretherketone (PEEK), polyarysulfon  
 e (PAS), <sup>polymethylpentene</sup> ~~polymethylpenten~~ (TPX), liquid  
 crystal polymer, silicone resin, natural  
 rubber (NR), butyl rubber (IIR), acrylonitr  
 ile-butadiene rubber (NBR), chloroprene  
 rubber (CR), styrene butadiene rubber (SBR),  
 butadiene rubber (BR).

<sup>the</sup> ~~Production~~ method of <sup>the resin composition</sup> ~~the resin compos-~~  
~~ition~~ for purging away <sup>contaminants</sup> ~~contaminant~~ <sup>according to</sup>  
 the present invention is not limited  
 to <sup>any</sup> ~~specific~~ method; however, <sup>the</sup> following  
 method is desirable.

To the 100 parts by weight of a ~~thermo-~~ <sup>thermoplastic</sup>  
~~plastic~~ resin, 0.1~10 parts by weight of  
 a borate ester of glycol ether expressed  
 by general formula (1) is added.

The ~~form of the~~ thermoplastic resin  
 may be, powder or pellet form.

in the form  
 of a

The borate ester of polyoxyalkylenes may be soaked into thermoplastic resin powder or pellet. pellets

~~The soaking~~ <sup>It</sup> is desirable to conduct <sup>the soaking</sup> at <sup>transition</sup> the temperature of over the glass transition point <sup>so that</sup> because at the temperature soaking speed is fast.

~~The other~~ <sup>Another</sup> production method for <sup>producing</sup> purge resin <sup>compositions</sup> composition of the present <sup>invention</sup> invention may be conducted as follows.

The thermoplastic resin and borate ester of polyoxyalkylenes are fed <sup>into</sup> into a plastic processing machine or bunbury mixer, in which they are blended and extruded <sup>through a</sup> from pelletizing die having many <sup>holes</sup> hole of 3~7mm diameter.

Each extruded <sup>strings</sup> strings <sup>are</sup> are cut to form <sup>pellets</sup> pellet having <sup>the</sup> length of 3~7mm.

~~In case~~ <sup>It</sup> the amount of the borate ester of polyoxyalkylenes is less than 0.1

parts by weight, the resin composition

for purging does not exhibit the <sup>cleaning</sup> cleaning <sup>purging</sup> and purging effect, <sup>if on the other hand the amount of</sup> and in case more

than 10 % parts by weight, ~~it is not desirable because the~~ <sup>a</sup> uniform polymer blend is barely obtained.

<sup>the</sup> borate ester of polyoxyalkylenes

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## EXAMPLE

Now, the resin <sup>compositions</sup> composition for purging away <sup>contaminants</sup> contaminant in the plastic processing machine according to the present invention will be described in further detail with reference to ~~Example~~ <sup>specific Examples</sup>

However, it ~~should~~ <sup>should</sup> be understood that



the present invention is by no means restricted by such specific ~~Example~~. *Examples*

#### Example 1

Borate ester of polyoxyalkylene ~~expressed~~ *expressed* by chemical formula (2) was ~~obtained~~ *obtained* by following synthesis process.

In a 7000 ml flask equipped with three inlet ~~pipe~~ *pipes* and displaced by nitrogen gas were charged 146g (1 mole) of triethyl borate  $[B(OC_2H_5)_3]$ , 1.2g of dibutyl tin dilaurate and 50 ml of benzene.

Subsequently, ~~to~~ *to* the solution in the flask ~~was added with~~ *were added* 996g (3 mole) of tripropyleneglycol triethylenglycol monomethyl ether under stirring ~~condition~~ *conditions* ~~on~~ to obtain uniform blended solution.

Subsequently, the solution in the flask was stirred for 13 hours at 95°C under ~~the condition~~ *conditions* of distillation to remove ~~the~~ *and* ethanol and benzene as the byproduct *to* to obtain 1002g (0.99 mole) of a borate ester of polyoxyalkylene ~~expressed~~ *expressed* by chemical formula (2).

*a* In a vessel, 99.0 parts by weight of high pressure low density polyethylene (made by Nippon Unicar Company Ltd., melt mass flow rate 1.2g/10 min., density 0.923 g/cm<sup>3</sup>) and 1.0 parts by weight of borate ester of polyoxyalkylene ~~expressed~~ *expressed* by chemical formula (2) obtained by above *minutes* mentioned method were blended for 5 ~~min~~ *minutes* ~~utes~~ *at* under room temperature to obtain *a* ~~mixture~~ *mixture*, ~~then~~ *then* the mixture was thrown ~~in~~ *into* to the continuous blending extruder (made *a*

by K. C. K. Company Ltd., machine name K. C. K 80X2-35 VEX type) to produce ~~the~~<sup>a</sup> resin ~~composition~~<sup>contaminant</sup> for purging away a ~~contaminant~~<sup>as</sup> in a pellet form having <sup>a</sup> length of 3 mm and <sup>a</sup> diameter of 3mm.

The resin composition was named ~~thereafter~~<sup>thereafter</sup> after purge resin composition (1).

Subsequently, the purging effect ~~valuation~~<sup>evaluation</sup> test was conducted by following ~~procedures~~<sup>procedure</sup>.

~~Dry-blend~~<sup>A dry-blend</sup> was prepared by blending 95 kg of ~~non-coloured~~<sup>non-colored</sup> low density polyethylene pellets (made by Tosco Company Ltd., PETLOSENE 183) with 5kg of ~~colour~~<sup>color</sup> master batch (made by Tokyo Ink Company Ltd., PEX 3152, blue ~~coloured~~<sup>colored</sup>). Then the obtained dry-blend of 100kg ~~were~~<sup>was</sup> thrown to ~~the~~<sup>the</sup> hopper of ~~the~~<sup>an</sup> extruder having <sup>a</sup> 65mm diameter screw. Then the dry-blend ~~were~~<sup>was</sup> fed into ~~the~~ extruder to be heat-kneaded.

After 100kg of ~~the~~<sup>the</sup> dry-blend were passed through the extruder, the purge resin ~~composition~~<sup>contaminants</sup> (1) for purging away ~~contaminant~~ of the present invention obtained by above mentioned method ~~were~~<sup>was</sup> fed to the same extruder and passed through ~~the~~<sup>the</sup> ~~said~~<sup>until</sup> purge resin composition (1) ~~till~~<sup>the</sup> the residue of above mentioned ~~colour~~<sup>color</sup> master batch which ~~were~~<sup>was</sup> stuck or adhered to the ~~surface~~<sup>surface</sup> of the screw and barrel ~~were~~<sup>was</sup> purged.

This procedure is called as ~~decolourization~~<sup>decolorization</sup>.

As the blank test, ~~the~~<sup>the</sup> decolourization test were conducted except that the resin composition for purging away ~~con~~<sup>contaminants</sup>

taminant of the present invention was exchanged <sup>by for</sup> the non-coloured linear low density polyethylene <sup>pellets</sup> ~~pellet~~ (made by Toso Company Ltd., FS240A). <sup>purge</sup> <sup>composition</sup>

Company Ltd., FS240A). <sup>purge</sup> <sup>composition</sup>  
Also, comparative ~~purge~~ resin ~~composition~~  
~~tion~~ I and comparative <sup>purge</sup> <sup>composition</sup> ~~purge~~ resin ~~comp~~  
~~osition~~ II were prepared for comparative  
~~decolourization~~ <sup>decolorization</sup> <sup>tests</sup> test, which were <sup>equivalent</sup> ~~equiva-~~  
~~lent~~ to the conventional <sup>purge</sup> resin  
composition as described in <sup>the</sup> <sup>1</sup> above " ~~Desc-~~  
~~ription~~ of the Related Art " <sup>section</sup> ~~section~~.

### Comparative pargé resin composition I

Resin composition consisting 99.0 weight % of high pressure low density polyethylene (made by Nippon Unicar Company Ltd., melt massflow rate 1.2g/10 min., density 0.923g/cm<sup>3</sup>) and 1.0 weight % of poly(9) oxyethylene nonylphenyl ether.

## Comparative pargé resin composition II

Resin composition consisting 99.0 weight % of high pressure low density polyethylene (made by Nippon Unicar Company Ltd., melt massflow rate 1.2g/10 min., density 0.923g/cm<sup>3</sup> and 1.0 weight % of poly (II) oxyethylene dodecylether sodium sulfate.

Result of decourrization of  
purge resin composition (1)

Each purge resin resin composition ~~am-~~ amount  
~~unt~~ used till decolourization were ~~obse-~~ observed

rved were as follows.

- Purge resin composition (1)  
of the present invention ..... 22kg
- Blank test ..... 280kg
- Comparative purge resin  
composition I ..... 250kg
- Comparative purge resin  
composition II ..... 230kg

According to the above <sup>results</sup> ~~result~~, it <sup>can be seen</sup> ~~was~~ <sup>composition (I)</sup> ~~recognized~~ that the purge resin ~~composition (I)~~ was excellent compared to the comparative purge resin ~~composition~~, <sup>compositions</sup> because the ~~used~~ <sup>used</sup> amount of purge resin composition (1) <sup>used</sup> was about 10% of the ~~used~~ amount of conventional type <sup>purge</sup> resin composition <sup>used</sup> ~~resulting to achieve~~ <sup>resulting</sup> cost and time saving. <sup>savings</sup>

#### Example 2

Borate ester of polyoxyalkylenes <sup>expressed</sup> ~~expressed~~ by chemical formula (8) was ~~obtain-~~ <sup>obtained</sup> ~~ed~~ by following synthesis process.

In a 7000 ml flask equipped with three inlet <sup>pipes</sup> ~~pipe~~ and displaced by nitrogen gas were charged 146g (1 mole) of triethyl borate  $[B(OC_2H_5)_3]$ , 1.2g of dibutyl tin dilaurate and 50ml of benzene.

Subsequently, <sup>to</sup> the solution in the flask <sup>was</sup> ~~was added with~~ 756g (3 mole) of pentylethyleneglycol monomethyl ether <sup>were added</sup> under stirring <sup>conditions</sup> ~~condition~~ to obtain <sup>a uniform</sup> ~~uniform~~ <sup>(form)</sup> blended solution.

Subsequently, the solution in the flask was stirred for 13 hours at 95°C under ~~the condition of~~ distillation to

<sup>↑</sup>  
conditions

remove ~~a~~ ethanol and benzene as the <sup>by product</sup> ~~product~~ <sup>and</sup> to obtain 758g (0.99 mole) of a borate ester of polyoxyalkylene ~~expressed~~ <sup>expressed</sup> ~~sed~~ by chemical formula (8).

In a vessel, 99.0 parts by weight of a high pressure low density polyethylene (made by Nippon Unicar Company Ltd., melt mass flow <sup>rate</sup> ~~late~~ 1.2g/10 min., density 0.923g/cm<sup>3</sup>) and 1.0 parts by weight of borate ester of glycol ether expressed by chemical formula (8) obtained by above mentioned method and 1.0 parts by weight of polyoxyethylene (9) lauryl amine were blended for 5 minutes <sup>at</sup> ~~under~~ room temperature <sup>temperature</sup> ~~ature~~ to obtain <sup>a mixture</sup> ~~a mixture~~. Then the <sup>mixture</sup> ~~mixture~~ <sup>continuous-blending-extruder</sup> ~~re~~ was thrown into the ~~continuous-blending-extruder~~ (made by K. C. K. Company Ltd., machine name K. C. K 80X2-35 VEX type) to produce <sup>a</sup> ~~the~~ resin composition for <sup>purging</sup> ~~purging~~ away ~~a~~ contaminant <sup>as</sup> ~~as~~ <sup>in</sup> a pellet form having <sup>a</sup> ~~a~~ length of 3mm and <sup>a</sup> ~~a~~ diameter of 3mm.

The resin composition was named ~~there~~ <sup>hereafter</sup> ~~after~~ purge resin composition (2). <sup>evaluation</sup>

Subsequently, the purging effect ~~valuation~~ <sup>evaluation</sup> test was conducted by following procedures. <sup>A dry-blend</sup>

~~Dry-blend~~ <sup>A dry-blend</sup> was prepared by blending 95 kg of <sup>a</sup> ~~a~~ <sup>non-colored</sup> ~~non-colored~~ low density <sup>polyethylene</sup> ~~polyethylene~~ <sup>a pellets</sup> ~~ene pellets~~ (made by Toso Company Ltd., PETLOSENE 183) with 5kg of <sup>color</sup> ~~colour~~ master batch (made by Tokyo Ink Company Ltd., PEX 3152, blue <sup>colored</sup> ~~coloured~~). Then the obtained dry-blend of 100kg <sup>was</sup> ~~were~~ thrown to <sup>the</sup> ~~a~~ hopper of <sup>the</sup> ~~the~~ extruder having <sup>a</sup> ~~a~~ 65mm diameter screw. Then the dry-blend <sup>was</sup> ~~were~~ fed into <sup>the</sup> ~~the~~ extruder to be heat-kneaded.

After 100kg of dry-blend were passed through the extruder, the purge resin composition (2) for purging away <sup>contaminants</sup> ~~contami-~~nant of the present invention obtained by above mentioned method ~~were~~ <sup>was</sup> fed <sup>into</sup> to the same extruder and passed through ~~the~~ <sup>until</sup> said ~~purge resin composition (2)~~ till the residue of above mentioned ~~colour~~ <sup>color</sup> master batch which ~~were~~ <sup>was</sup> stuck or adhered to the ~~surface~~ <sup>surfaces</sup> of the screw and barrel were purged.

#### Result of decolorization of purge resin composition (2)

Each purge resin amount used till ~~deco-~~ <sup>decolorization</sup> ~~lourization~~ <sup>was</sup> ~~were~~ observed were as follows.

- Purge resin composition (2)  
of the present invention ..... 20kg
- Blank test ..... 280kg
- Comparative purge resin  
composition I ..... 250kg
- Comparative purge resin  
composition II ..... 230kg

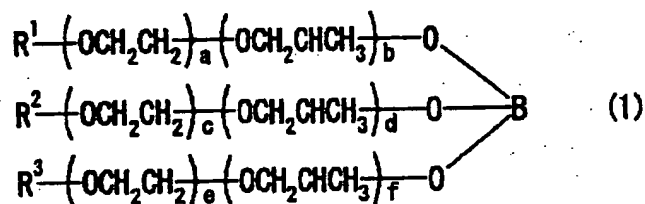
According to the above result, it ~~was~~ <sup>can be seen</sup> ~~recognized~~ that ~~the~~ purge resin composition (2) of present invention was excellent compared to the other purge resin, ~~beca-~~ <sup>because</sup> use the ~~used~~ <sup>resins</sup> amount of purge resin comp-  
osition of the present invention <sup>was</sup> ~~was~~ about 10% of the ~~used~~ <sup>used</sup> amount of ~~convent-~~ <sup>conventional</sup> ional ~~purge resin composition~~ <sup>purge composition</sup> ~~resulting~~ <sup>used</sup> to ~~achieve~~ cost and time ~~saving~~ <sup>savings</sup>

# WHAT IS CLAIMED IS

1. A resin composition for purging away contaminant in the plastic processing machine comprizing

(A) 100 parts by weight of a thermoplastic resin

(B) 0.1-10 parts by weight of a borate ester of polyoxyalkylene expressed by the following general formula (1)



wherein  $R^1$ ,  $R^2$  and  $R^3$  are independently selected from group consisting of hydrogen and hydrocarbon group, a, b, c, d, e and f are positive integers independently from 0 to 30 whose sum is from 6 to 80.

2. A resin composition for purging away contaminant in the plastic processing machine according to claim 1, which further comprizing

(C) 0.1-10 parts by weight of a aminogroup containing compound.

3. A purging method of a contaminant in the plastic processing machine by passing the resin composion of claim 1 or 2 through inside of said plastic processing machine.

# ABSTRACT

Disclosed is a resin composition for purging away contaminant in the plastic processing machine and a purging method of a contaminant in the plastic processing machine using the resin composition.

The resin composition comprizes a thermoplastic resin and borate ester of polyoxyalkylene.